

DUV32

248nm Anti-Reflective Coating

The anti-reflective coating products produced by Brewer Science are revolutionary in the photolithography field. These innovations help enhance photosensitive resist performance by absorbing light, thus minimizing reflectivity. The DUV family has been specifically formulated for 248nm lithography. Within the family, the DUV32 series acts as a planarizing material that produces a thin film over topography. This film helps to eliminate the substrate reflectivity phenomena. By eliminating the reflectivity, standing waves are also reduced, resulting in an improved product and more efficient lithography overall.

The DUV32 series' spin bowl compatibility is an added advantage that serves our customers' needs. Another important feature in this series is the thermal crosslinking on the substrate, which helps reduce the reflectivity more than was possible in the past. The increased amount of light absorbed results in a reflectivity of less than 1% at the first minima. This combined with the planarizing characteristic of the DUV32 series ensures the ability to better control resist thickness over steps. Wherever reflective notching occurs or CD control needs to be increased, DUV32 can be used; specifically it is used for any poly, contact, via and metal applications. With added control over the substrates, our customers are able to create the best products possible, giving customers this edge is a goal that Brewer Science continually strives to meet.

The DUV32 series are specifically formulated to be compatible with Acetal type DUV photoresists.

◆ DUV32 Features

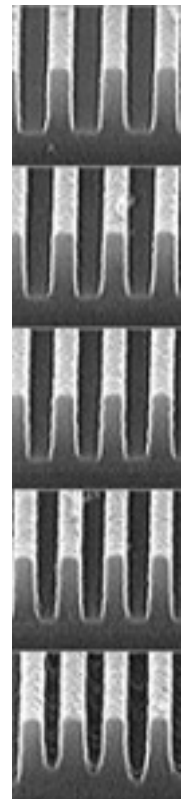
- ◆ Spin bowl compatible
- ◆ Reflectivity less than 1% at first minima
- ◆ Thermally crosslinked on the substrate
- ◆ Planarizing BARC material
- ◆ Optimized for performance with Acetal type resists
- ◆ Demonstrated at 0.15m design rules

◆ Optical Properties

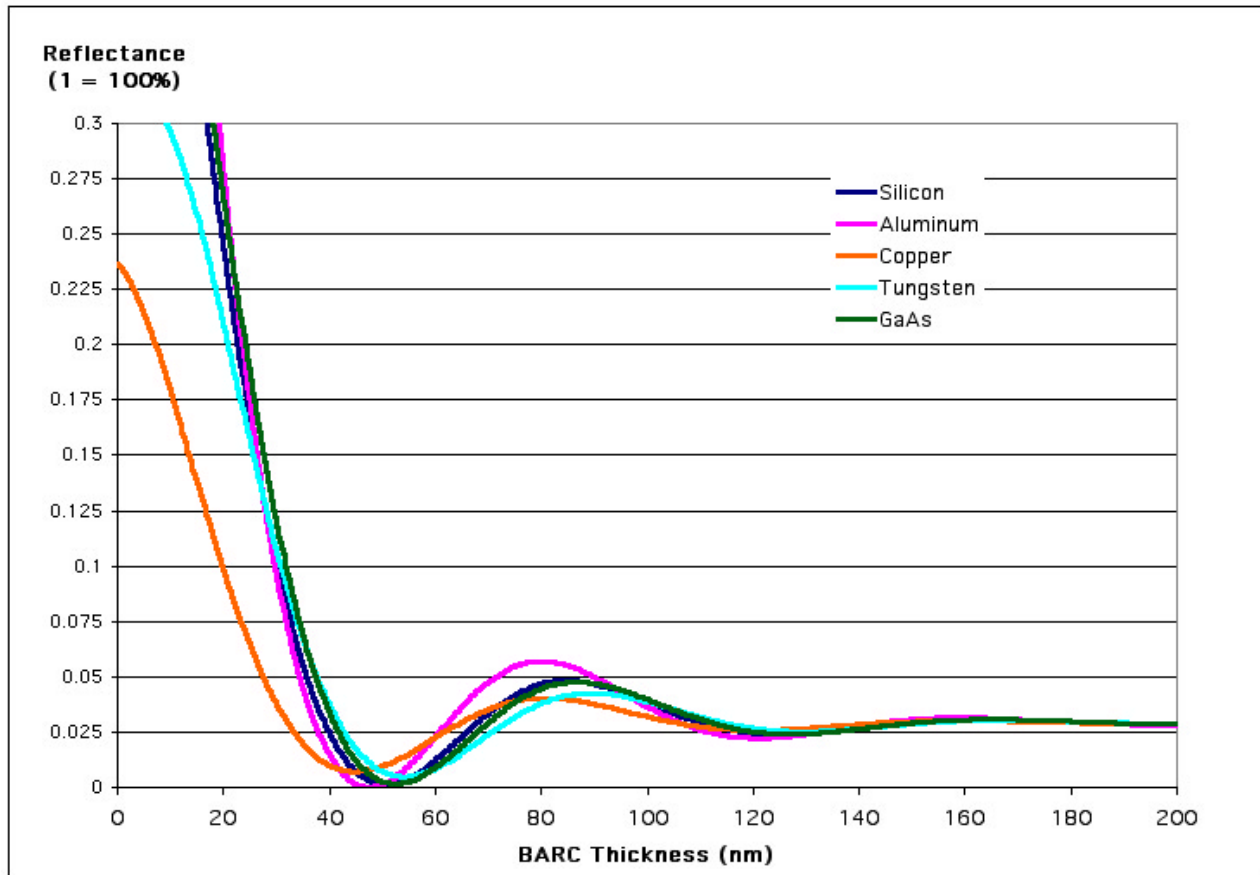
$$n = 1.595 \quad k = 0.555$$

$$A_n = 1.6104 \quad B_n = 8.85E-03 \quad C_n = 1.76E-03$$

Sub = DUV32 on bare Si
SB = 90C/90 secs
Resist = Sumitomo PEK-125
FT = 0.52m
PEB = 100C/90 secs
EXP = Nikon
NSR-2205EX12B
NA = 0.55, 2/3 Annular
Dev = TMAH 60 sec puddle
SEMS courtesy of Sumitomo



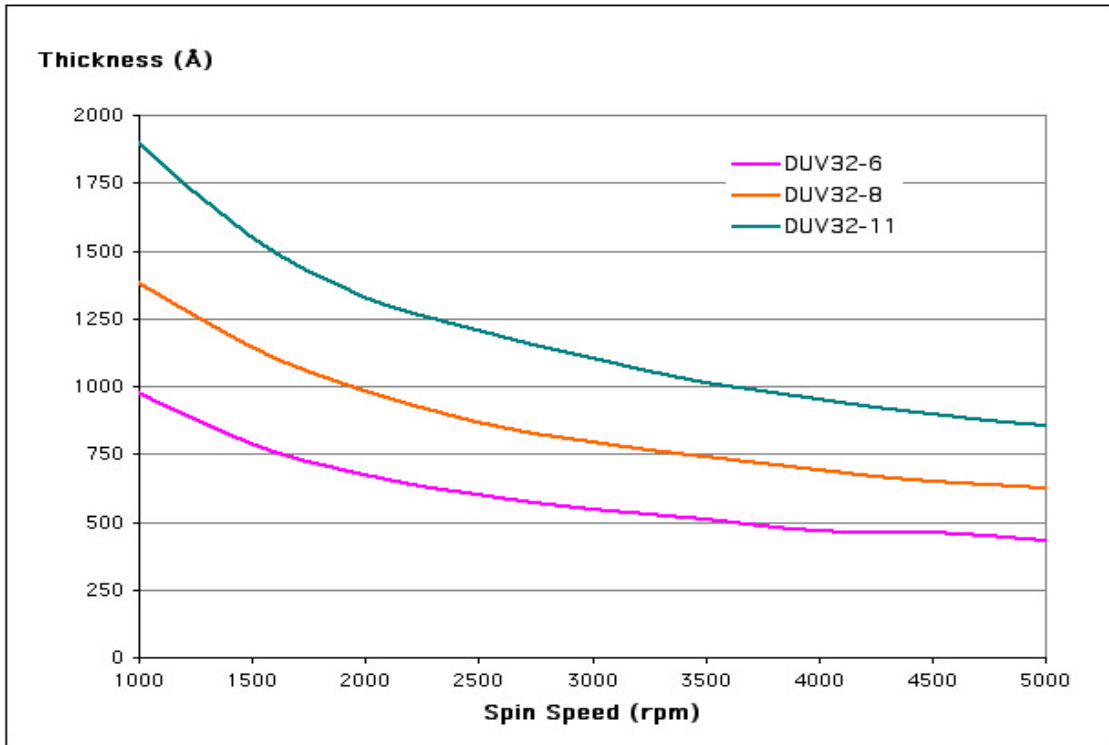
◆ Reflectivity Curve



◆ Processing Conditions

- ◆ Coat: DUV32 is applied by a spin coat process. Apply with a dynamic dispense at 400-1200 rpm and immediately ramp, without a spread spin, to 2000 - 5000 rpm for 30 secs. Use standard EBR and backside process at less than 1500 rpm with any standard EBR solvent, such as Brewer Science EBC Solvent. An adhesion promoter is not required.
- ◆ Bake: Single hotplate bake at $205 \pm 20^\circ\text{C}$ for 60 seconds. Bake may require temperature optimization to achieve the desired photoresist profile. A prebake of $90 - 110^\circ\text{C}$ for 30 seconds will increase the planarization of the BARC
- ◆ Resist Coat: Resist can be applied over the BARC without any modification to standard resist spin or bake process. An adhesion promoter is not required.
- ◆ Exposure: In most applications, exposure dose may need to be increased from that of stand-alone resist process by 20 - 50% due to the reduction in reflected light from the substrate.
- ◆ Resist Develop: Use standard photoresist develop parameters.
- ◆ Dry Etch: DUV32 may be dry etched by a number of plasma etch methods in a range of etch gases including: O_2 , $\text{O}_2/\text{CHF}_3/\text{Ar}$, C_2F_6 , Cl_2 , N_2/O_2 , O_2/HBr and HCl .
- ◆ Stripping: DUV32 can be removed by an oxidizing plasma or an oxidizing solvent strip process such as Ozone plasma strip, Piranha, RCA clean.

◆ Spin Speed Curve



Hot plate baked
@ 205°C for 60

◆ Typical Properties

Generic Properties:

Ions (Al, Cu, Mg, Mn, K)	<25ppb
Ions (Ca, Fe, Na)	<50ppb
Shelf Life @ 21°C ± 5°C	12 months
Percent Water	≤0.5%
Liquid Particles 0.3mm/ml	≤50

Product Specific Properties	DUV32-6	DUV32-8	DUV32-11	DUV32-16
Thickness (Å) @ 3000 rpm				
Bake 205°C	550Å ± 30Å	800Å±40	1100Å±50	1600Å±50
Normalized Film				
Absorbance @248nm	0.66±0.06	0.98±0.06	1.37±0.05	2.00±0.20
Viscosity (cst)	2.43±0.08	2.60±0.10	2.80±0.06	3.15±0.20

All statements, technical information and recommendations contained herein are based on tests we believe to be accurate, but the accuracy or completeness thereof is not guaranteed, and the following is made in lieu of warranty expressed or implied. Neither the seller nor manufacturer shall be liable for any injury, loss or damage, direct or consequential, arising from the use or inability to use the product. Before using, user shall determine the suitability of the product for his intended use, and user assumes all risk and liability whatsoever in connection therewith. No statement or recommendation not contained herein shall have any force or effect unless in an agreement signed by officers of the seller and manufacturer.

ARC ® is a registered trademark of Brewer Science, Inc, Rolla, Missouri, USA, WiDE™ and NEXT™ applications are pending.